

FIRST REPORT

1999 Ohio Precision Agriculture Survey

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This is a first report of results from the 1999 Ohio Precision Agriculture Survey. It estimates the current level of adoption of various components of precision farming (PF) technologies. Farmers, industry leaders and educators can use this information to identify research and education needs. Precision farming technology has a potential impact on farm economics, environmental quality and long-run implications on resource use under the changing structure of the farm industry in locations where it is deployed. The technology has other economic implications through identification of commodity origination (identity preservation) for both production and marketing reasons.



Preliminary Results

Adoption rates for various precision farming components differ greatly (Table 1). The most frequently adopted PF practices are spot-spraying of pesticides, georeferenced grid soil sampling, and variable-rate application of phosphorus and potassium fertilizers. Least frequently adopted practices include GPS-based spot spraying of herbicides, georeferenced field scouting for weeds, pests and disease, aerial field photography, and variable-rate application of pesticides. The final row in table 1 gives the percentage of farmers who have adopted at least one of the listed PF practices. Overall, about 24% have adopted at least one such practice.

<u>PF Component</u>	<u>Percent adopting</u>
Spot Spraying of Pesticides	12.10%
Georeferenced Grid Soil Sampling	8.10%
Variable Rate Application (VAR) of Phosphorus	7.30%
VRA of Potassium	7.30%
VRA of Lime	6.70%
VRA of Nitrogen	6.30%
Yield Monitor	6.00%
VRA of Herbicides	5.70%
Boundary Mapping	4.30%
VRA of other Nutrients	3.90%
Variable Seeding Rate	3.40%
VRA of Pesticides	2.90%
Aerial/Infrared Field Photography	2.70%
Georeferenced Field Scouting for Weeds	2.30%
Georeferenced Field Scouting for Pests, or Disease	2.00%
GPS or Sensor-Directed Spot Spraying of Herbicides	1.30%
Farmers adopting one or more PF components above	23.64%

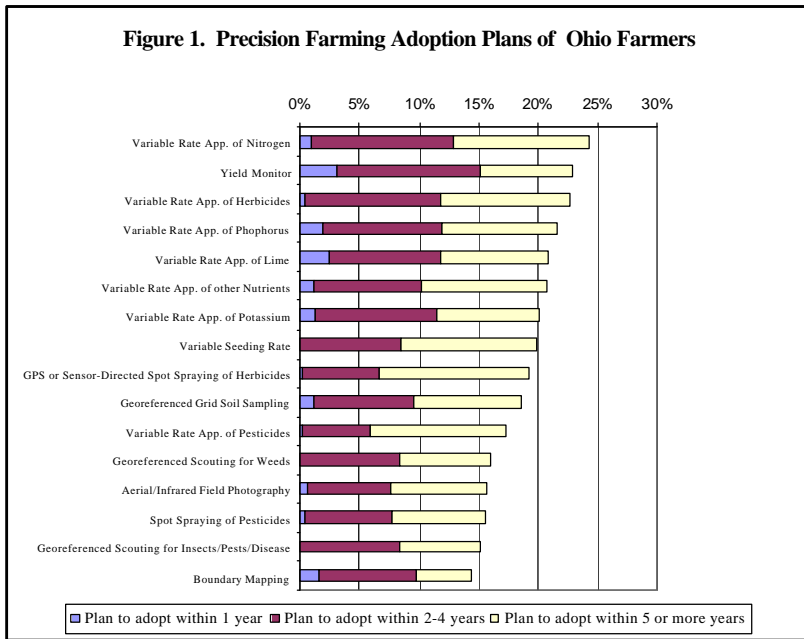
	<u>Adopting Farmers*</u>
Full sample	23.77%
Gross Farm Sales:	
Less than \$100,000	18.28%
\$100,000 - 249,999	36.44%
\$250,000 - 499,999	34.85%
\$500,000 - 999,999	40.91%
\$1,000,000 and over	60.00%
Age of operator:	
Less than 35 years	48.39%
35 - 45 years	29.17%
45 - 55 years	23.81%
55-65 years	18.00%
65 years and older	19.83%
Extension District:	
Northwest	21.43%
Northeast	25.42%
Southwest	28.47%
East	17.91%
South	29.10%

* Adopted at least one PF Component

In Table 2 the adoption percentage (adoption of at least one of the listed practices) is shown for various groups based on size of farm (gross sales), age of the operator, and location. There is a strong association between farm size and PF adoption. Only 18% of those farms with sales between \$40,000 and \$100,000 have adopted one or more of the listed PF practices. However, 41% and 60% of Ohio



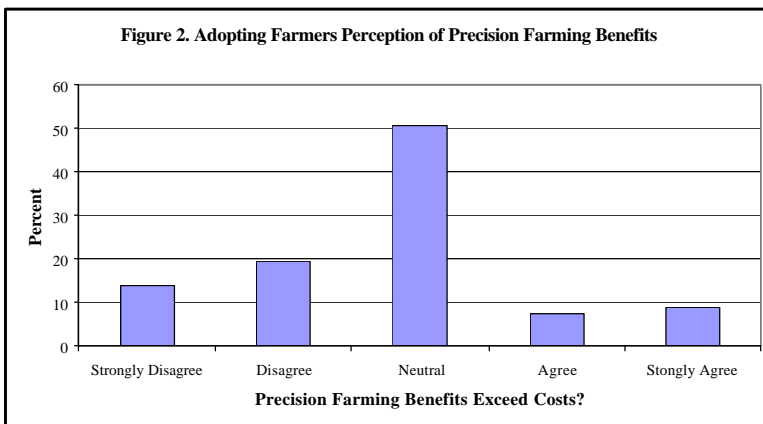
Figure 1. Precision Farming Adoption Plans of Ohio Farmers



farms in the largest two sales classes, respectively, have adopted one or more PF practices. A similar relationship was observed with operator age. Nearly half of the youngest farm operators have tried at least one PF technology compared to less than 20% for farmers older than 55. Finally, adoption rates vary significantly by location within the state — as expected, rates are highest in counties with a crop focus.

Farmers who have not yet adopted any PF technology were asked their plans (figure 1). They expressed greatest interest in combine yield monitors and variable-rate application of nitrogen, herbicides, phosphorus, and lime. Still, a great many of these farmers have no concrete plans for any of these technologies.

Figure 2. Adopting Farmers Perception of Precision Farming Benefits



Effectiveness of Precision Farming Systems

Adopting farmers were asked about their perceptions of whether PF technologies improved the performance of the farm firm. Figure 2 summarizes the results for the statement — “*the benefits of precision farming clearly exceed its costs.*” Results clearly demonstrate that farmers using PF are split in their evaluation. Approximately equal percentages of farmers strongly agreed and strongly disagreed with this statement. This suggests either a difference in the results farmers are obtaining with these technologies, or a difference in how farmers measure their costs and benefits.

Future Reports:

Other preliminary observations that will be reported in greater detail in future publications include:

- PF farmers disagree on whether variable-rate input application reduce fertilizer and pesticide use, increase yields, or decrease yield variation.
- Farmers who have not yet adopted PF technologies indicate that the large financial investment and the uncertain payback are the most important reasons why.
- Combine yield monitors have been widely adopted on the largest farms. Fifty percent of farmers in the largest sales class use yield monitors.
- Most farmers who reported grid soil sampling are using grid sizes of 2 to 3 acres.
- Operators of share-leased land pay for all grid soil sampling and variable rate fertilizer application in about half the cases. When landlord and operator shared these expenses, it is usually in a fifty-fifty split.

About the research

The 1999 Ohio Precision Agriculture Survey was administered by mail to a representative sample of 2,500 Ohio Farmers. Responses from 1351 producers yielded 782 who were farming and completed the survey. The characteristics of respondents closely matched the age and farm size distributions from the 1997 Census of Agriculture. Readers should be cautioned that results reported here are preliminary. Data analysis will continue with more detailed results reported in the next few months.

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